

**TWO NEW SPECIES OF *MICROVELIA* FROM TREEHOLES,
WITH NOTES ON OTHER CONTAINER-INHABITING VELIID
SPECIES (HETEROPTERA: VELIIDAE)**

JOHN T. POLHEMUS

Colorado Entomological Museum, 3115 S. York, Englewood, CO 80110

Abstract.—*Microvelia cavicola* sp. n. and *Microvelia karunaratnei* sp. n. are described from water-filled treeholes in Panama and Sri Lanka respectively. Distributional and synonymical notes are given for other veliid species inhabiting treeholes.

Key words. Heteroptera; Veliidae; *Microvelia*, taxonomy, new species; tree hole habitat; Panama; Sri Lanka.

Although a number of veliid species are known from container habitats in the New World, and some have been recorded from the Old World, only five of these are known to inhabit tree holes, i.e., *Paravelia myersi* (Hungerford, 1931) from Trinidad and Panama, *Cylicovelia kenyana* Polhemus and Copeland (1996) from Kenya, a *Microvelia* sp. from Guadalcanal (Laird, 1956:166), plus two new species of *Microvelia* described below from Panama and Sri Lanka.

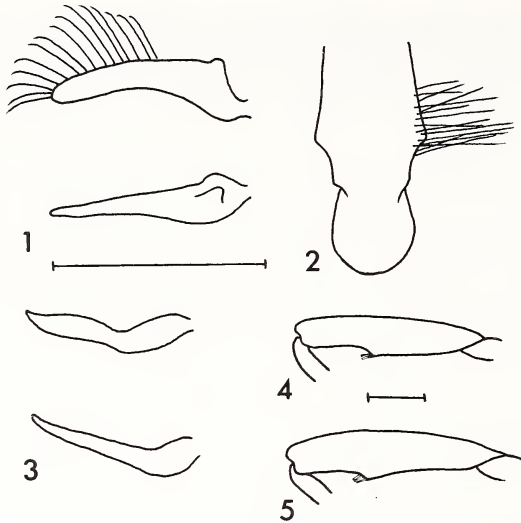
In the American tropics the terrestrial and arboreal bromeliads that have water pockets harbor a guild of eight veliid species endemic to them (reviewed by Polhemus & Polhemus, 1991), belonging to the genera *Paravelia* Breddin and *Microvelia* Westwood. In addition, two *Microvelia* species are known from crabholes on the Pacific coast of Costa Rica (Polhemus & Hogue, 1972), and one *Microvelia* species from a "crab burrow" on the Atlantic coast of Costa Rica (Drake, 1952). Yang and Kovac (1995) recorded species of *Baptista* and *Lathriovelia* (Microvelinae) from water filled bamboo internodes in West Malaysia. All of these taxa are so far known only from their particular container habitats.

MATERIALS AND METHODS

One of the new *Microvelia* species described here was discovered by S. Yanoviak during an extensive study of the tree hole fauna of Panama. The second new species, from Sri Lanka, was found long ago by the late P. B. Karunaratne, living in water filled rot holes four or five feet off the ground.

Genitalia drawings were made with a Wild microscope at 80× from preparations immersed in glycerin. Leg drawings were made with a camera lucida at 40×, then magnified. All measurements were made with a micrometer grid.

The following institutions either lent material, or are repositories; Smithsonian Institution, National Museum of Natural History, Washington (USNM); American Museum of Natural History, New York (AMNH); J. T. Polhemus Collection, Englewood, CO (JTPC); National Museum of Sri Lanka, Colombo (CNMS); Zoological Museum, University of Copenhagen (ZMUC); S. Yanoviak Collection (SYC).



Figs. 1–2. *Microvelia cavicola* n. sp. 1. Male right paramere, two views; 2. Male proctiger, dorsal view, long setae shown on right side only. Scale bar = $\frac{1}{4}$ mm.

Figs. 3–5. *Microvelia karunaratnei* n. sp. 3. Male right paramere, two views; 4–5. Male legs (usual setae not shown), 4. Middle femur, lateral view; 5. Hind femur, lateral view. Scale bar = $\frac{1}{4}$ mm

Microvelia cavicola, new species

Figs. 1–2

Diagnosis. *Microvelia cavicola* belongs to the *Microvelia laesslei* group which also includes the species *M. ancona* Drake & Chapman, *M. distanti* Lundblad, and *M. laesslei* Drake & Hussey. This group is characterized by: brown or blackish ground color; pronotum covering mesonotum and all or most of metanotum; antennal segments III and IV slender, subequal in length, and about 1.5× the length of segment II; micropters with bright white wing pads; apters with bright silvery or white markings on basal abdominal tergites and connexiva; macropters with extensive bright white markings basally on the hemelytra, plus sometimes an apical white spot; male parameres long, symmetrical; obligate inhabitants of tree holes or bromeliad water pockets.

The three described species of the *M. laesslei* group were included in a key to bromeliadiculous veliids furnished by J. and D. Polhemus (1991), where the micropterous morph of *M. cavicola* keys to *M. laesslei* but drops there in the macropterous morph, as it has only broad basal white spots on the hemelytra rather than the entire basal third white as in *M. laesslei*. The micropters differ from *M. laesslei* in the much smaller wing pads (vs. large and covering almost the basal abdominal tergites in *M. laesslei*), and shorter and broader body. The very long, setose parameres and modified proctiger with lateral tufts of long setae separate *M. cavicola* from all other described *Microvelia* species.

Description. *Size.* Micropterous male, length 1.91–2.16 mm (mean = 2.00 mm, N

= 10); width 0.58–0.68 mm (mean = 0.63 mm, N = 10). Micropterous female, length 2.16–2.41 mm (mean = 2.29 mm, N = 10); width 0.68–0.83 mm (mean = 0.76 mm, N = 10). Macropterous male, length 2.16–2.27 mm (mean = 2.22 mm, N = 10); width 0.79–0.83 mm (mean = 0.81 mm, N = 10). Macropterous female, length 2.30–2.45 mm (mean = 2.37 mm, N = 10); width 0.83–0.94 mm (mean = 0.88 mm, N = 10).

Color. Ground color dark brown tinged with rufous; venter brown. Head brown, tinged with rufous, light brown ventrally; rostrum luteous on basal three segments, piceous distally. Pronotum with anterior lobe entirely orange brown, extending onto pleural region; collar brown, disc dark brown, slightly lighter laterally. Abdominal tergites dark brown; tergite VII, connexiva brown. Wing pads bright white, sparsely set with long dark setae. Legs, antennae testaceous to brown; antennal segments III, IV lighter.

Micropterous male with head of moderate length, declivant anteriorly; length 0.43; eyes small, width of eye/interocular space, 0.09/0.47. Pronotum long, extending over base of abdominal tergite II (first visible tergite), humeri not prominent; disc set with numerous foveae; length:width, 0.51: 0.63. Wing pads rounded posteriorly, rarely acuminate, tips surpassing posterior margin of pronotum. Abdominal tergites II–V subequal in length (0.12–0.14), VI slightly longer (0.15), VII longest (0.23); intersegmental suture between II–III, III–IV narrow, with numerous hair-free pits; tergites V–VII with a median hair-free longitudinal stripe on midline finely rugulose, shining. Entire dorsum set with fine pubescence, appearing golden in certain light angles, longer on tergites II–IV. Connexiva moderately raised, tapering evenly along tergite VII, posterolateral angles of abdomen set with long setae directed caudad. Mesosternum, metasternum tumid, posterior margin of mesosternum with a pair of posteriorly directed tubercles, one on either side of midline, in contact with metasternum. Abdominal venter set with short appressed setae, mixed with longer setae laterally; ventrite VII unmodified, posterior margin slightly concave. Legs clothed with short setae intermixed with sparse longer setae; antennae set with short setae and scattered longer setae. Legs unarmed, unmodified; all femora weakly fusiform; all tibia straight, anterior tibia with short ventral comb, $\frac{1}{5}$ of tibial length. Claws, arolia normal, slender.

Antennal segments I, II stout, III, IV long, slender; formula I:II:III:IV; 0.17: 0.14: 0.26: 0.37.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.47: 0.37: 0.21: 0.0; of middle leg, 0.56: 0.53: 0.12: 0.19; of hind leg, 0.60: 0.64: 0.14: 0.21.

Abdominal terminalia as shown in figures 1–2; first genital segment (VIII) shining beneath, unmodified; proctiger rounded, protruding posteriorly, with lateral tufts of many long setae (Fig. 2). Paramere very long, slender, set with a row of extremely long curved setae (Fig. 1), visible without dissection.

Macropterous male very similar to micropterous male in most respects, but pronotum broader, humeri slightly raised. Hemelytra with usual 4 closed cells, blackish brown, extending beyond tip of abdomen; entire basal angle bright white, extending beyond posterior pronotal margin; without distal white marks; veins lighter basally; inner margin, and broad medial longitudinal stripe, greyish; basally and laterally with long semi-erect setae. Abdominal dorsum with prominent paired longitudinal

carinae on tergite II, lacking in micropterous form; intersegmental sutures along anterior margins of segments II–V broad, becoming narrower posteriorly with successive segment, each with numerous large hair-free pits.

Micropterous female very similar to micropterous male in most respects. Female tergite VIII on same plane as VII, truncate posteriorly, length slightly more than half of VII; first gonocoxae large, plate-like. Legs slightly more slender than male, not fusiform, lacking fore tibial comb. Abdominal pleural region slightly concave and faintly shining on segments V, VI, apparently to aid phoresy.

Macropterous female very similar to winged male in most respects, but slightly larger. Somatic characters as in micropterous female.

Etymology. The name *cavicola* is derived from the Latin “cavus” meaning hollow or hole, and the New Latin “cola” meaning “dwelling in.”

Discussion. *Microvelia cavicola* was discovered in water-filled treeholes on Barro Colorado Island. Specimens were found in natural holes of six tree species, and artificial treeholes constructed of plastic. See the companion article by Yanoviak in this issue for further details.

Distribution. Panama.

Types. Holotype, micropterous ♂, PANAMA, Canal Zone, Barro Colorado Island, treehole in *Platypodium elegans*, hole SY96-732, 27.vi.1996, S. Yanoviak (USNM). Paratypes (nymphs not paratypes): Panama, Canal Zone, Barro Colorado Island, all collected by S. Yanoviak: 8 micropterous ♂, 6 macropterous ♂, 1 micropterous ♀, 14 macropterous ♀, same data as holotype; 1 macropterous ♀, treehole in *Platypodium elegans*, hole SY96-745, 26.v.1996; 1 macropterous ♂, 1 macropterous ♀, same, except hole OMF-84, 31.v.1996; 3 micropterous ♂, 5 macropterous ♂, 2 micropterous ♀, 10 macropterous ♀, 2 nymphs, same, except hole SY96-539, 11.vii.1996; 2 macropterous ♀, same, except hole SY96-760, 25.vii.1996; 1 macropterous ♂, 2 macropterous ♀, 2 nymphs, treehole in *Ficus* sp., hole SY96-729, 14.vi.1996; 2 macropterous ♂, 2 micropterous ♀, same, except hole SY96-729, 31.v.1996; 2 micropterous ♂, 8 micropterous ♀, 6 nymphs, same, except hole SY96-716, 1.viii.1996; 5 macropterous ♂, 2 nymphs, treehole in *Dipteryx panamensis*, hole #90, 0.1 m above ground, 24.v.1996; 1 macropterous ♂, hole #92, same except 0.2 m above ground; 1 macropterous ♀, 1 nymph, hole #93, same except 0.9 m above ground; 4 micropterous ♂, 3 macropterous ♂, 5 micropterous ♀, 1 macropterous ♀, 4 nymphs, treehole in *Pseudobombax septenatum*, hole SY96-743, 9.vii.1996; 5 micropterous ♂, 5 macropterous ♂, 17 macropterous ♀, 1 nymph, treehole in *Alseis blackiana*, hole SY96-532, 25.v.1996; 3 macropterous ♂, 1 micropterous ♀, 5 macropterous ♀, same, except hole SY96-532, 8.vii.1996; 9 micropterous ♂, 2 macropterous ♂, 6 micropterous ♀, 2 macropterous ♀, 3 nymphs, treehole (unknown tree sp.), hole SY96-539, 27.v.1996; 1 macropterous ♂, 2 macropterous ♀, same, except hole OMF-47, 26.v.1996; 3 macropterous ♂, same, except hole OMF-65, 26.v.1996; 2 macropterous ♂, 6 macropterous ♀, artificial treehole (R2UF), 23.x.1995 (JTFC, USNM, AMNH, ZMUC, SYC).

Microvelia karunaratnei, new species

Figs. 3–5

Diagnosis. *Microvelia karunaratnei* sp. n. is similar in most respects to species of the New World *Microvelia laesslei* group (see characterization of the *M. laesslei*

group under *M. cavicola* above), but differs in having a bright white spot in the medial cell of each hemelytron, a characteristic of species belonging to *Microvelia* s. str. The modified middle and hind femora separate *M. karunaratnei* from all other *Microvelia* species except *M. ancona*; these two species are unique in the genus in having the middle and hind femora fusiform, ventrally set with short spines (along with the usual longer setae) and a small tumescence or spur.

Description. *Size.* Micropterous male, length 2.44 mm (N = 1); width 0.89 mm (N = 1). Micropterous female, length 2.89 mm (N = 2); width 1.05 mm (N = 2). Macropterous male, length 2.66 mm (N = 1); width 1.22 mm (N = 1). Macropterous female, length 2.50–2.83 mm (mean = 2.69 mm, N = 4); width 1.00–1.17 mm (mean = 1.12 mm, N = 4).

Color. Ground color dark brown tinged with rufous; venter similar, but lighter. Head brown, tinged with rufous, light brown ventrally; rostrum fuscous on basal three segments, piceous distally. Pronotum with anterior lobe orange brown medially, darkening laterally; collar very narrow, brown, disc dark brown, slightly lighter laterally. Abdominal tergites dark brown; tergite VII, connexiva brown. Wing pads bright white, with a row of ca. 7 dark setae along outer margin. Legs, antennae testaceous to brown; antennal segments III, IV lighter.

Micropterous male with head of moderate length, declivant anteriorly; length 0.35; eyes small, width of eye/interocular space, 0.10/0.37. Pronotum long, extending over base of abdominal tergite II (first visible tergite), humeri not prominent; disc set with numerous small foveae; length:width, 0.60: 0.86. Wing pads narrowly rounded posteriorly, tips not surpassing posterior margin of pronotum. Abdominal tergites II–VI subequal in length (0.16), VII longest (0.26); intersegmental suture between II–III, III–IV narrow, with numerous hair-free pits; tergites V–VII with a median hair-free longitudinal stripe on midline finely rugulose, shining. Entire dorsum set with fine pubescence, appearing golden in certain light angles, longer on tergites II–IV. Connexiva moderately raised, tapering evenly along tergite VII, posterolateral angles of abdomen set with a few longer setae directed caudad.

Mesosternum, metasternum slightly tumid, posterior margin of mesosternum with a pair of posteriorly directed tubercles, one on either side of midline, in contact with metasternum. Abdominal venter set with short appressed setae, slightly longer laterally and caudally; ventrite VII unmodified, posterior margin slightly concave. Legs clothed with short setae intermixed with sparse longer setae; antennae set with short setae and scattered longer setae. Legs modified; mid and hind femora thickened basally, abruptly narrowed at distal $\frac{2}{3}$, there with a small ventral patch of dark setae (Figs. 4, 5); all femora weakly fusiform; all tibia straight, anterior tibia with short ventral comb, $\frac{1}{6}$ of tibial length. Claws, arolia normal, slender.

Antennal segments I, II stout, III, IV long, slender; formula I:II:III:IV; 0.26: 0.67: 0.35: 0.47.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.67: 0.55: 0.28: 0.0; of middle leg, 0.77: 0.72: 0.12: 0.23; of hind leg, 0.88: 0.86: 0.14: 0.26.

Abdominal terminalia unmodified; first genital segment shining beneath; tergite IX rounded, protruding posteriorly. Paramere curved, broad, blade-like, narrowly acuminate distally, without long setae (fig. 3), not visible without dissection.

Macropterous male very similar to micropterous male in most respects, but pro-

notum broader, humeri slightly raised. Hemelytra brown, extending beyond tip of abdomen, with usual 4 closed cells, plus a fifth distal cell open posteriorly; basal angle bright white, extending to or slightly beyond posterior pronotal margin, in the shape of an obtuse triangle, with inner posterior margin angled cephalad; inner distal closed (medial) cell with an elongate white streak; distally with a long wedge-shaped white mark widening posteriorly, usually reaching apex of wing or nearly so; outer distal closed cell sometimes with a faint light spot medially; margin of wing light colored, except costal margin; basally and laterally with moderately long semi-erect setae. Abdominal dorsum under wings not examined.

Micropterous female very similar to micropterous male in most respects. Wing pads broadly to narrowly rounded behind, reaching to or slightly beyond posterior margin of pronotum. Female tergite VIII on same plane as VII, truncate posteriorly, length slightly more than half of VII; first gonocoxae large, plate-like. Legs very similar to male, similarly modified, lacking fore tibial comb.

Macropterous female very similar to winged male in most respects, but slightly larger. Somatic characters as in micropterous female.

Etymology. The name *karunaratnei* honors the late P. B. Karunaratne. Karu, as he was fondly known, made many fine contributions to the knowledge of all aspects of the natural history of Sri Lanka, but especially the aquatic and semiaquatic Heteroptera.

Discussion. All specimens were collected in tree rotholes about 2 m above the ground. Nothing more is known about the ecology of this species.

Distribution. Sri Lanka.

Types. Holotype, macropterous ♂, SRI LANKA, Padukka, Arakawila Jungle, ex. rot hole filled with rain water on tree trunk 5 ft. above ground, 8.viii.1971, P. B. Karunaratne (USNM). Paratypes: SRI LANKA: 2 macropterous ♀, same data as holotype (USNM); 1 micropterous ♂, 2 macropterous ♀, same data as holotype except 15.vi.1971 (JTPC, USNM); 2 micropterous ♀, Kandy, Reservoir Jungle, ex. rain water filled rot hole in tree trunk, Ht. 5 ft., 4.iii.1972, P. B. Karunaratne (JTPC, USNM). (A note with the specimens, in Karunaratne's handwriting, concerning the holotype locality states "From this same rot hole 8 specimens were collected on the 1st April 1971 and 8.viii.1971." As there are only three specimens from these collections in the material presented by Karunaratne, there should be 5 more specimens in the National Museum of Sri Lanka (CNMS), and they are considered paratypes.)

Paravelia myersi, Hungerford

Velia myersi Hungerford 1931:172. (Holotype, macropterous male, Trinidad, tree-hole, BMNH.)

Paravelia myersi Polhemus 1976:512.

Discussion. A number of specimens of this species were found by Yanoviak during his study of the fauna of treeholes in Panama. Previously *P. myersi* was known only from Trinidad, thus Panama is a considerable range extension. This raises the possibility that *Paravelia atra* (Polhemus, 1969) from Peru is a synonym; although the latter is known only from a single male without habitat data, the male parameres are very similar. A series of specimens from Peru will be needed to settle this question.

Material examined (all specimens macropterous). PANAMA, **Canal Zone**, Barro Colorado Island, all collected by S. Yanoviak: 1 ♀, treehole in *Platypodium elegans*, hole SY96-620, 10.vi.1996; 1 ♂, 1 nymph, treehole in *Pseudobombax septenatum*, hole SY96-743, 9.vii.1996; 1 nymph, treehole (unknown tree sp.), hole OMF-12, 9.vii.1996; 1 nymph, same, except hole OMF-3, 20.vi.1996; 2 ♀, artificial treehole (R5MC), 6.vii.1996; 1 ♂, same, except hole (RICF), 1.viii.1996; 1 ♂, same, except hole (R6CF), 3.vi.1995; 2 ♀, same, except hole (insectary SY-803), 11.vi.1996 (JTPC). TRINIDAD: 1 ♂, 2 ♀, T.210, 24.i.1929, I. H. Myers (JTPC).

ACKNOWLEDGMENTS

I thank Steve Yanoviak for allowing me to study the Panamanian veliids, and the late P. B. Karunaratne for furnishing the specimens from Sri Lanka.

JTP carried out this research as a faculty affiliate of the Entomology Department, Colorado State University, Fort Collins.

LITERATURE CITED

- Drake, C. J., 1952. Two new *Microvelia* Westwood (Hemiptera: Veliidae). Bull. Brooklyn Entomol. Soc. 47:13–15.
- Hungerford, H. B., 1931. A new *Velia* from Trinidad (Hemiptera, Veliidae). Ann. Mag. Nat. Hist. (10) 7:172–175.
- Laird, M. 1956. Studies of mosquitoes and freshwater ecology in the South Pacific. R. Soc. New Zealand, Bull. No. 6:1–213.
- Polhemus, J. T. 1969. A new *Velia* from Peru, and the description of the male of *Velia helenae* Hungerford (Hemiptera: Veliidae). Proc. Entomol. Soc. Wash. 71:55–58.
- Polhemus, J. T. 1976. A reconsideration of the status of the genus *Paravelia* Breddin, with other notes and a check list of species (Veliidae: Heteroptera). J. Kansas Entomol. Soc. 49:509–513.
- Polhemus, J. T. and R. S. Copeland, 1996. A new genus of Microveliinae from treeholes in Kenya (Heteroptera: Veliidae). Tijdschr. Entomol. 139:73–77.
- Polhemus, J. T. and C. L. Hogue, 1972. Two new *Microvelia* from crabholes in Costa Rica (Hemiptera: Veliidae). Los Angeles Co. Mus. Nat. Hist., Contr. Sci., No. 224, pp. 1–6.
- Polhemus, J. T. and D. A. Polhemus, 1991. A review of the veliid fauna of bromeliads, with a key and description of a new species (Heteroptera: Veliidae). J. New York Entomol. Soc. 99:204–216.
- Yang, C. M. and Kovac, D. 1995. A collection of aquatic and semi-aquatic bugs (Insecta: Hemiptera: Gerromorpha and Nepomorpha) from Temengor Forest Reserve, Hulu Perak, Malaysia. Malayan Nature J. 48:287–295.

Received 22 February 1999; accepted 19 July 1999